

AMENDMENTS TO THE CLAIMS

Claim 1 (Previously Presented): A piston made of aluminum cast alloy,
wherein the aluminum cast alloy has a hypereutectic structure and comprises:

Mg (Magnesium): equal to or less than 0.2 mass %,

Ti (Titanium): 0.15-0.3 mass %,

Si (Silicon): 10-21 mass %,

Cu (Copper): 2-3.5 mass %,

Fe (Iron): 0.1-0.7 mass %,

Ni (Nickel): 1-3 mass %,

P (Phosphorus): 0.001-0.02 mass %,

V (Vanadium): 0.02-0.3 mass%,

Zr (Zirconium): 0.02-0.3 mass%,

Mn (Manganese): 0.2-0.7 mass%,

Ca (Calcium) : 0.0005-0.003 mass %,

Al (Aluminum): the remaining portions, and

impurities.

Claims 2-4 (Canceled)

Claim 5 (Original): The piston made of aluminum cast alloy as claimed in Claim 1,
wherein pre-use Vickers harness of the piston is in the range from HV 70 to 100.

Claim 6 (Original): The piston made of aluminum cast alloy as claimed in Claim 1,
wherein size of non-metal inclusion existing within the piston is less than 100 μm .

Claim 7 (Withdrawn): A method of manufacturing a piston made of aluminum cast alloy, the method comprising:

a casting step of forming a piston by casting aluminum cast alloy which comprises Mg (Magnesium): equal to or less than 0.2 mass %, Ti (Titanium): 0.15-0.3 mass %, Si (Silicon): 10-21 mass %, Cu (Copper): 2-3.5 mass %, Fe (Iron): 0.1-0.7 mass %, Ni (Nickel): 1-3 mass %, P (Phosphorus): 0.001-0.02 mass %, V (Vanadium): 0.02-0.3 mass%, Zr (Zirconium): 0.02-0.3 mass%, Mn (Manganese): 0.2-0.7 mass%, Ca (Calcium) : 0.0005-0.003 mass %, Al (Aluminum): the remaining portions and impurities,
a cutting step of providing a cutting operation to the piston, and
producing the piston made of aluminum cast alloy of Claim 1.

Claims 8-10 (Canceled)

Claim 11 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 7, wherein after the piston has been formed by the step of casting, the piston is stood to cool to room temperature.

Claim 12 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 7, wherein after the piston has been formed by the step of casting, prior to or after the cutting step, an annealing step of retaining the piston at a temperature of 250-400°C for 0.5-24 hours is carried out so that pre-use Vickers hardness of the piston is in the range from HV 70 to 100.

Claim 13 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 12, wherein after the casting step has been carried out, a solution heat treatment step of retaining the piston at a temperature of 450-510°C for 1-12 hours is carried out, then, a quenching step of rapidly cooling the piston is provided, and subsequently, the annealing step is carried out.

Claim 14 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 13, wherein after the quenching step has been carried out, an aging step of retaining the piston at a temperature of 180-280°C for 1-12 hours is provided, and subsequently, the annealing step is carried out.

Claim 15 (Previously Presented): A piston made of an aluminum cast alloy, wherein the aluminum cast alloy has a hypereutectic structure and comprises:

Mg (Magnesium): 0.2-2 mass %,
Ti (Titanium): 0.15-0.3 mass %,
Si (Silicon): 10-21 mass %,
Cu (Copper): 2-3.5 mass %,
Fe (Iron): 0.1-0.7 mass %,
Ni (Nickel): 1-3 mass %,
P (Phosphorus): 0.001-0.02 mass %,
V (Vanadium): 0.02-0.3 mass%,
Zr (Zirconium): 0.02-0.3 mass%,
Mn (Manganese): 0.2-0.7 mass%,
Ca (Calcium) : 0.0005-0.003 mass %,
Al (Aluminum): the remaining portions, and impurities, and

wherein pre-use Vickers hardness (Vickers hardness prior to the initiation of use) of the piston is in the range from HV 70 to 100.

Claims 16-18 (Canceled)

Claim 19 (Original): The piston made of aluminum cast alloy as claimed in Claim 15, wherein size of non-metal inclusion existing within the piston is less than 100 μm .

Claim 20 (Withdrawn): A method of manufacturing a piston made of aluminum cast alloy, the method comprising:

a casting step of forming a piston by casting aluminum cast alloy which comprises Mg (Magnesium): 0.2-2 mass %, Ti (Titanium): 0.15-0.3 mass %, Si (Silicon): 10-21 mass %, Cu (Copper): 2-3.5 mass %, Fe (Iron): 0.1-0.7 mass %, Ni (Nickel): 1-3 mass %, P (Phosphorus): 0.001-0.02 mass %, V (Vanadium): 0.02-0.3 mass%, Zr (Zirconium): 0.02-0.3 mass%, Mn (Manganese): 0.2-0.7 mass%, Ca (Calcium) : 0.0005-0.003 mass %, Al (Aluminum): the remaining portions and impurities,

an annealing step of retaining the piston at a temperature of 250-400 °C for 0.5-24 hours in order to make that pre-use Vickers hardness of the piston in the range from HV 70 to 100,

a cutting step of providing a cutting operation to the piston prior to or after the annealing step, and

producing the piston made of aluminum cast alloy of Claim 15.

Claims 21-23 (Canceled)

Claim 24 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 20, wherein after the casting step is carried out, a solution heat treatment step of retaining the piston at a temperature of 450-510°C for 1-12 hours is carried out, then, a quenching step of rapidly cooling the piston is provided, and subsequently, the annealing step is carried out.

Claim 25 (Withdrawn): The method of manufacturing a piston made of aluminum cast alloy as claimed in Claim 24, wherein after the quenching step is carried out, an aging step of retaining the piston at a temperature of 180-280°C for 1-12 hours is provided, and subsequently, the annealing step is carried out.

Claim 26 (Previously Presented): A piston made of an aluminum cast alloy, wherein the aluminum cast alloy has a hypereutectic structure and comprises:

Mg (Magnesium): 0.2-2 mass %,
Ti (Titanium): 0.15-0.3 mass %,
Si (Silicon): 10-21 mass %,
Cu (Copper): 2-3.5 mass %,
Fe (Iron): 0.1-0.7 mass %,
Ni (Nickel): 1-3 mass %,
P (Phosphorus): 0.001-0.02 mass %,
V (Vanadium): 0.02-0.3 mass%,
Zr (Zirconium): 0.02-0.3 mass%,
Mn (Manganese): 0.2-0.7 mass%,
Ca (Calcium) : 0.0005-0.003 mass %,
Al (Aluminum): the remaining portions, and impurities.

Claims 27-29 (Canceled)

Claim 30 (Previously Presented): The piston made of aluminum cast alloy as claimed in Claim 26, wherein size of non-metal inclusion existing within the piston is less than 100 μm .

Claim 31 (Previously Presented): A piston made of aluminum cast alloy, wherein the aluminum cast alloy has a hypereutectic structure and comprises:

Mg (Magnesium): equal to or less than 0.1 mass %,

Ti (Titanium): 0.15-0.3 mass %,

Si (Silicon): 10-21 mass %,

Cu (Copper): 2-3.5 mass %,

Fe (Iron): 0.1-0.7 mass %,

Ni (Nickel): 1-3 mass %,

P (Phosphorus): 0.001-0.02 mass %,

V (Vanadium): 0.02-0.3 mass%,

Zr (Zirconium): 0.02-0.3 mass%,

Mn (Manganese): 0.2-0.7 mass%,

Ca (Calcium) : 0.0005-0.003 mass %,

Al (Aluminum): the remaining portions, and

impurities.

Claims 32-34 (Canceled)

Claim 35 (Previously Presented): The piston made of aluminum cast alloy as claimed in Claim 31, wherein pre-use Vickers harness of the piston is in the range from HV 70 to 100.

Claim 36 (Previously Presented): The piston made of aluminum cast alloy as claimed in Claim 31, wherein size of non-metal inclusion existing within the piston is less than 100 μm .

Claims 37-38 (Canceled)

Claim 39 (New): The piston made of aluminum cast alloy as claimed in Claim 1, wherein the aluminum cast alloy consists of:

Mg (Magnesium): equal to or less than 0.2 mass %,

Ti (Titanium): 0.15-0.3 mass %,

Si (Silicon): 10-21 mass %,

Cu (Copper): 2-3.5 mass %,

Fe (Iron): 0.1-0.7 mass %,

Ni (Nickel): 1-3 mass %,

P (Phosphorus): 0.001-0.02 mass %,

V (Vanadium): 0.02-0.3 mass%,

Zr (Zirconium): 0.02-0.3 mass%,

Mn (Manganese): 0.2-0.7 mass%,

Ca (Calcium) : 0.0005-0.003 mass %,

optionally Cr (Chromium): 0.01-0.5 mass%,

optionally B (Boron): less than 0.01 mass%,

optionally Be (Beryllium): 0.01-0.5 mass%,

Al (Aluminum): the remaining portions, and

impurities.

Claim 40 (New): The piston made of an aluminum cast alloy as claimed in Claim 15,
wherein the aluminum cast alloy consists of:

Mg (Magnesium): 0.2-2 mass %,
Ti (Titanium): 0.15-0.3 mass %,
Si (Silicon): 10-21 mass %,
Cu (Copper): 2-3.5 mass %,
Fe (Iron): 0.1-0.7 mass %,
Ni (Nickel): 1-3 mass %,
P (Phosphorus): 0.001-0.02 mass %,
V (Vanadium): 0.02-0.3 mass%,
Zr (Zirconium): 0.02-0.3 mass%,
Mn (Manganese): 0.2-0.7 mass%,
Ca (Calcium) : 0.0005-0.003 mass %,
optionally Cr (Chromium): 0.01-0.5 mass%,
optionally B (Boron): less than 0.01 mass%,
optionally Be (Beryllium): 0.01-0.5 mass%,
Al (Aluminum): the remaining portions, and
impurities.

Claim 41 (New): The piston made of an aluminum cast alloy as claimed in Claim 26,
wherein the aluminum cast alloy consists of:

Mg (Magnesium): 0.2-2 mass %,
Ti (Titanium): 0.15-0.3 mass %,
Si (Silicon): 10-21 mass %,
Cu (Copper): 2-3.5 mass %,
Fe (Iron): 0.1-0.7 mass %,
Ni (Nickel): 1-3 mass %,
P (Phosphorus): 0.001-0.02 mass %,
V (Vanadium): 0.02-0.3 mass%,
Zr (Zirconium): 0.02-0.3 mass%,
Mn (Manganese): 0.2-0.7 mass%,
Ca (Calcium) : 0.0005-0.003 mass %,
optionally Cr (Chromium): 0.01-0.5 mass%,
optionally B (Boron): less than 0.01 mass%,
optionally Be (Beryllium): 0.01-0.5 mass%,
Al (Aluminum): the remaining portions, and
impurities.

Claim 42 (New): The piston made of aluminum cast alloy as claimed in Claim 31,
wherein the aluminum cast alloy consists of:

Mg (Magnesium): equal to or less than 0.1 mass %,

Ti (Titanium): 0.15-0.3 mass %,

Si (Silicon): 10-21 mass %,

Cu (Copper): 2-3.5 mass %,

Fe (Iron): 0.1-0.7 mass %,

Ni (Nickel): 1-3 mass %,

P (Phosphorus): 0.001-0.02 mass %,

V (Vanadium): 0.02-0.3 mass%,

Zr (Zirconium): 0.02-0.3 mass%,

Mn (Manganese): 0.2-0.7 mass%,

Ca (Calcium) : 0.0005-0.003 mass %,

optionally Cr (Chromium): 0.01-0.5 mass%,

optionally B (Boron): less than 0.01 mass%,

optionally Be (Beryllium): 0.01-0.5 mass%,

Al (Aluminum): the remaining portions, and

impurities.